

# Impact of socioeconomic markers in severity of lower extremity lymphedema

## *Impacto dos marcadores socioeconômicos na gravidade do linfedema das extremidades inferiores*

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### Abstract

In Brazil, the incidence of lymphedema is poorly known, and there is little scientific documentation reporting the association of lymphedema with the social and economic factors in our region. The objective was to analyze the impact of socioeconomic markers on the severity of lymphedema of the lower extremities according to the classification of Mowlem in the metropolitan region of Salvador (BA), Brazil. Of the 324 patients studied, 200 (62%) were female. The age ranged between 14 and 69 years, median 48 years. Comparatively analyzing the varying severity of lymphedema versus education level and severity versus family income, it showed that 93.8% of patients classified as Mowlem III were included in the group of patients without education and/or with income up to three minimum wages. There was no record of advanced disease in patients with family incomes greater than seven minimum wages and/or graduate.

**Keywords:** lymphedema; classification; severity of illness index; educational status.

### Resumo

No Brasil, a incidência do linfedema é pouco conhecida e poucas são as documentações científicas reportando a associação do linfedema com os fatores sociais e econômicos na nossa região. O objetivo do estudo foi analisar o impacto dos marcadores socioeconômicos na gravidade do linfedema das extremidades inferiores conforme a classificação de Mowlem, na região metropolitana de Salvador (BA). Dos 324 pacientes estudados, 200 (62%) eram do gênero feminino. A idade variou entre 14 e 69 anos, com mediana de 48 anos. Analisando comparativamente as variáveis: gravidade do linfedema *versus* grau de escolaridade e gravidade *versus* renda familiar, observou-se que 93,8% dos pacientes classificados como Mowlem III estavam incluídos no grupo dos pacientes sem escolaridade e/ou com renda familiar de até três salários-mínimos. Não houve registro de doença avançada em pacientes com renda familiar acima de sete salários-mínimos e/ou com terceiro grau completo.

**Palavras-chave:** linfedema; classificação; índice de gravidade de doença; escolaridade.

### Introduction

The main function of the lymphatic system is to re-absorb macromolecules and interstitial fluid, keeping stable the extracellular composition. In addition, lymph nodes are important sites of the immune system, where phagocytosis, antigen presentation to macrophages and

lymphoplasmacytic proliferation occur. Lymphopathy, which causes reduced lymphatic function and consequent deficit of interstitial drainage, leads to lymphedema, characterized by increased volume and weight of the affected region, reduced function and cosmetic alterations, that may result in fibrosis along the disease course<sup>1,2</sup>. Complications

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such as cellulitis, erysipela, chronic ulcers, fibroedema and lymphangiosarcoma, may aggravate the initial condition<sup>3</sup>.

Regarding its etiology, it can be classified as primary and secondary, according to the classification of Kinmonth et al.<sup>4</sup>. Primary lymphedema results from congenital alterations of lymphatic vessels, whereas secondary lymphedema results from acquired alterations that occur after infections, trauma, operations, radiotherapy, chronic venous insufficiency, among other causes<sup>4,5</sup>.

The exact prevalence of lymphatic disorders has not been well defined in the literature, due to the scarcity of epidemiological data, although its occurrence is largely underestimated in clinical practice. The estimated prevalence is around 450 million people with lymphatic disorders, i.e., 15%, of the world population<sup>6</sup>. In Brazil, the incidence and distribution of lymphedema are little known. Likewise, there is little scientific information on the association of lymphedema with social and economic factors in our region<sup>6,7</sup>.

The objective of this study was to analyze the impact of socioeconomic markers (education level and family income) on the severity of lower extremity lymphedema, according to Mowlem's classification, in the metropolitan region of Salvador (BA), Brazil.

## Methods

The study analyzed consecutively 324 patients with lower extremity lymphedema that came to the Service of Vascular Surgery at Hospital Geral Roberto Santos (HGRS), between November 2005 and May 2010. The patients had access to the Service through spontaneous demand to the outpatient clinic and therefore, this is a non-probabilistic sample.

The patients were examined using a preset clinical protocol that included personal data, such as age, sex, comorbidities, socioeconomic level and lymphedema etiology and severity, according to Mowlem's classification<sup>8,9</sup> (Chart 1), with the agreement of more than one examiner (two Vascular Surgery specialists, HGRS). In cases of bilateral lymphedema, only the limb with higher severity was included in the study. The patients were then stratified by education level (no education, basic, intermediate and higher levels) and by family income (less than 1 minimum wage, 1-3, 3-5, 5-7 and above 7 minimum wages), which were the analyzed variables.

Logistic regression technique<sup>10</sup> was used to analyze the relation between variables and lymphedema severity, with the adoption of p value below 0.05 for statistically significant factors.

Due to the observational and descriptive nature of the study, the patients' treatment was not influenced by the study. All participants in this study were asked to sign the informed consent form.

The study was approved by the HGRS Ethics Committee and was conducted following the ethical principles of the Declaration of Helsinki and local and international standards of good clinical practices in clinical research.

Out of the 324 patients studied, 200 (62%) were female and 124 (38%) were male. The age ranged from 14 to 69 years, with median value of 48 years.

Regarding associated diseases, most patients (77%) had obesity, followed by arterial hypertension (49%) and diabetes mellitus (47%).

Regarding the severity, 81 (25%) patients presented with lymphedema Mowlem I, 146 (45%) had Mowlem II and 97 (30%) had Mowlem III.

## Results

Tables 1 and 2 show the frequency distribution of patients by education level and disease severity and

**Chart 1.** Mowlem's Classification.

Grade I	Reversible lymphedema, with elevated limb and bed rest for 24-48 hours: edema is depressible at compression
Grade II	Irreversible lymphedema, even with extended rest; moderate-to-severe fibrosis and edema is non depressible at compression
Grade III	Irreversible lymphedema with accentuated fibrosis in subcutaneous tissue and limb elephantiasis

**Table 1.** Distribution of patients according to education level and disease severity, following Mowlem's classification.

	No education	Basic education concluded	Intermediate education concluded	Superior education concluded
Mowlem I	1	1	12	66
Mowlem II	57	50	29	10
Mowlem III	50	30	18	0

**Table 2.** Distribution of patients according to family income and disease severity, following Mowlem's classification.

	<1 minimum wage	1-3 minimum wages	3-5 minimum wages	5-7 minimum wages	>7 minimum wages
Mowlem I	2	3	10	29	36
Mowlem II	62	55	17	7	5
Mowlem III	78	16	3	1	0

family income and disease severity, respectively, according to Mowlem's classification.

When comparatively analyzing the variables: lymphedema severity *versus* education level and lymphedema severity *versus* family income, 93.8% of the patients classified as Mowlem III were in the group with no formal education and/or family income up to three minimum wages. No case of the disease in its most advanced stage was reported in patients with income family above seven minimum wages and/or with complete higher education level. These relations were statistically significant, with p value below 0.05 (Figures 1 and 2).

## Discussion

Lymphedema is a chronic disease characterized by the retention of high protein interstitial fluid, resulting from insufficient lymphatic drainage caused by congenital and/or acquired anomalies of the lymphatic system<sup>5,11</sup>. In the beginning, the edema is mild, soft and depressible at compression, but as the disease progresses, it becomes hard and non-depressible<sup>6,12</sup>. Chronically, this increased limb size can cause significant deformities, disability and, in extreme cases, elephantiasis. Besides that, it can undergo malignant transformation<sup>6</sup>. It can affect one or both lower extremities<sup>6</sup>.

The diagnosis is basically clinical and imaging exams, such as computed tomography and lymphoscintigraphy, are used to confirm the suspected diagnosis, to detect sites of lymphatic malformation and neoplasias and to exclude other causes of increased limb size<sup>8,13-15</sup>.

The frequency of lymphatic disease is much lower than the frequency of arterial and venous disease<sup>8</sup>. Lymphedema, however, it is not an uncommon disease. It is essential to know the prevalence and methods of treatment, in order to take early action. When not properly addressed, lymphedema may result in serious sequelae, limiting the patient's quality of life.

In this study, the incidence of women with lymphedema was high (62%). Such prevalence was also observed by Kefeijan-Haddad et al.<sup>6</sup> and agrees with data found in world literature<sup>8,16</sup>.

A higher prevalence of secondary lymphedema was observed, when compared to primary lymphedema (93% *versus* 7%). In the cohort, infection (post-erysipela) was the most frequent cause of secondary lymphedema, corresponding to 83% of the patients. Such data agree with the results obtained in other studies conducted in Brazil<sup>2,8</sup>. In contrast, in Europe, the bacterial and fungal infections

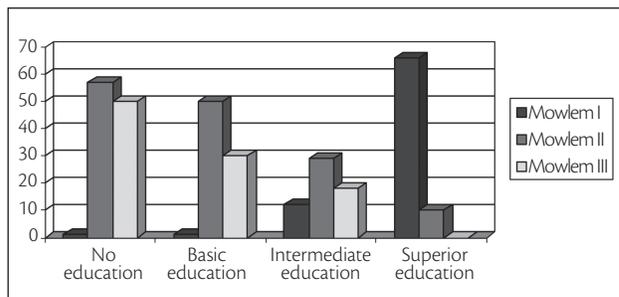


Figure 1. Comparative analysis between lymphedema severity and education level.

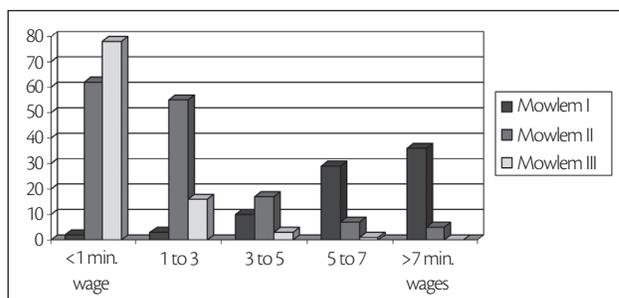


Figure 2. Comparative analysis between lymphedema severity and family income.

represent less frequent etiological factors, as demonstrated by Smith, Spittell and Schirger<sup>16</sup> and Milroy<sup>17</sup>. Post-operative lymphedema corresponded to 10% of the secondary lymphedema causes, as demonstrated by Guedes Neto<sup>8</sup>.

Regarding the severity of lymphedema, only 25% of patients were Mowlem I, while 45% were Mowlem II and 30% were Mowlem III. We observed that most patients with the disease in its most advanced stages (Mowlem II and III) were individuals with no education and/or low economic level. We reported that the social and economic level was inversely proportional to the lymphedema severity. This finding can be explained by the fact of having more difficult access to medical care, inadequate treatment and lack of instruction on lymphedema prevention after the initial episode of limb infection. It should be emphasized that, after the onset of lymphatic injury and lymphedema, the scarcity of specialized services in complex physical therapy offered by the Public Health Service (Sistema Único de Saúde) in Salvador may have contributed to such findings. On the other hand, there was no record of advanced disease in patients with family incomes greater than seven minimum wages and/or complete higher education, which confirmed the study results. A stronger awareness of the need for diagnosis and early treatment of lymphedema may help improve these patients' quality of life.

## Conclusion

The severity of lower extremity lymphedema, according to Mowlem's classification, was directly related to socioeconomic markers, such as low education level and low family income. Further studies on occurrence and severity of lymphedema are required for a better understanding of the related factors and prevention of this disorder in our region.

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